

General knowledge about lucid dreaming and lucid dream induction techniques: An online study

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Summary. A variety of induction techniques have been proposed to increase lucid dream frequency. An online survey was performed asking about knowledge of lucid dreaming and lucid dream induction techniques. The initial sample size was N=1380 with a subsample of N=716 who were asked questions concerning lucid dream induction techniques. The findings indicate that one quarter of all participants had heard of lucid dreaming once or several times via literature, the Internet or friends. An increase in age was negatively correlated to previous knowledge of lucid dreaming whereas female gender and higher education showed a positive correlation to knowledge about lucid dreaming via literature and friends. The lucid dream induction techniques of reality checks, critical questions, hypnosis and supplements are most commonly known to the subsample of the survey participants. Except for hypnosis these techniques are also the most often applied. The total number of techniques that are known correlated negatively with age, but not with gender or education. No significant differences, however, were found for the total number of techniques that were applied. It would be very interesting to study whether the reported application of these induction techniques – carried out in the home setting by the individual alone – had beneficial effects on lucid dream frequency as the efficacy of most induction techniques were only studied within formal research projects.

Keywords: Lucid dreaming, knowledge about lucid dreaming, lucid dream induction techniques

1. Introduction

In the field of sleep research, a lucid dream is generally defined as being aware of a dream while dreaming (LaBerge, 1985) – with the term “lucid” being derived from the Latin word for “clear”. An online survey (Schädlich & Erlacher, 2012) found 5 main topics what people are doing within their lucid dreams: The majority of respondents (about 80%) make use of their lucid dream abilities for simply having fun: flying, playing games, dancing, etc. Over half (about 60%) benefit from lucid dreams by decreasing their nightmare frequency and intensity. Other applications that were stated are problem solving (about 30%), development of creativity (about 27%) and practice of specific movements (about 21%). Lucid dreaming thus covers a variety of applications for the dreamer him/herself but may also be beneficial for science: lucid dreaming is a tool for obtaining deeper insight into the mind-body relationship (Erlacher & Schredl, 2008).

Reaching a lucid dream state is considered to be rather rare: Although the general population estimates suggest that about half of adults have experienced at least one lucid dream in their lifetimes (Saunders, Roe, Smith, & Clegg, 2016); only about 20% experience lucid dreams frequently (Schredl & Erlacher, 2011), i.e., having lucid dreams more than once a month (Snyder & Gackenbach, 1988). Interestingly, children seem to become lucid during dreams more

frequently than adults (Schredl, Henley-Einion, & Blagrove, 2012; Voss, Frenzel, Koppehele-Gossel, & Hobson, 2012). Moreover, cultural differences exist as well: a Japanese student sample revealed a significantly lower lucid dream frequency when compared to Dutch, German and American students (Erlacher, Schredl, Watanabe, Yamana, & Gantzert, 2008).

Likewise lucid dreaming is considered a learnable skill which is enhanced when trained and weakens when left unpracticed (LaBerge, 1980a; Schredl, 2013). As lucid dreaming offers several enjoyable and worthwhile properties, e.g., having fun or developing creativity (Schädlich & Erlacher, 2012), a diverse variety of induction techniques have been proposed (Gackenbach, 1985; LaBerge & Rheingold, 1990; Price & Cohen, 1988; Tholey, 1983). To structure the large number, Stumbrys, Erlacher, Schädlich, and Schredl (2012) introduced a classification into three main groups: Cognitive techniques, external stimuli, and miscellaneous techniques (see Table 1, adapted from Stumbrys et al., 2012).

Cognitive techniques include those that involve cognitive activities and, in general do not require special equipment. For the Mnemonic Induction of Lucid Dreams (MILD) technique, the dreamer first needs to remember his/her last dream and find elements typical for a dream which might lead to lucidity, e.g., bizarre animals such as unicorns. Then, the dreamer vividly imagines being back in the dream and becoming lucid by recognizing those bizarre elements. Additionally, when falling asleep, a sentence such as “The next time I am dreaming, I will realize that I am dreaming!” is repeated (LaBerge, 1980b; Levitan & LaBerge, 1994). Other techniques aim at a reflective mindset by asking oneself 5-10 times a day whether one is dreaming or not, e.g., critical questions or reality checks (Tholey, 1980). In addition to asking oneself the question whether one is awake or dreaming (critical question), in reality checks, a certain action is

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usually also performed, for instance jumping to test physical laws. According to the continuity theory, experiences from waking-life are incorporated into dreams (Hall & Nordby, 1972; Schredl, 2017) and therefore a reflective mindset is then continued in dreams (Stumbrys, 2011). Some techniques focus on intention or suggestion where one suggests oneself to have a lucid dream or intends to have a lucid dream by repeating a sentence like “This night I will recognize that I am dreaming and become lucid.” resp. “I intend to have a lucid dream tonight.” before falling asleep (Levitan, 1989; Spoomaker, Van den Bout, & Meijer, 2003). The Castaneda technique is done by planning to look at a pre-defined object such as one’s hands during a dream. Hence, when the dreamer looks at his/her hands during night, s/he is likely to realize that s/he is dreaming as the hands might look different and/or the dreamer realizes that looking at the hands was a pre-planned action (Castaneda, 1993; Tholey & Utecht, 1987). Waggoner and McCready (2015) introduced a modified version of the Castaneda technique: to look at one’s hands before going to bed and repeat “This night I will see my hands in my dream and realize that I am dreaming.” During hypnosis, a hypnotherapist guides the dreamer into a hypnotic state and suggests him/her to have a lucid dream this night (Levitan & LaBerge, 1994). Meditation comprises a large number of exercises which aim at training reflective and attention-based observation of one’s mind (Eifring, 2016) and which can increase lucid dream frequency as a side effect (Gillespie, 1988; Sparrow, 2013). The Wake-Up Back to Bed (WBTB) technique increases the REM sleep duration in early morning hours and thereby enhances the likelihood of becoming lucid (LaBerge, Phillips, & Levitan, 1994; Stumbrys & Erlacher, 2014). When using WBTB, one goes to sleep for 6 hours, stays awake for 30 minutes or for one hour and goes back to bed to take a nap in the early morning hours. In the waking period, the dreamer performs typically the MILD technique, i.e., the WBTB and MILD technique are often combined in empirical induction studies (Dyck, Schredl, & Kühnel, 2017). Typically the one hour condition is more effective than other time intervals, e.g., 30 minutes (LaBerge et al., 1994). Wake-Induced Lucid Dreams (WILD) techniques are used to directly enter a dream lucidly from the waking state by maintaining consciousness (Levitan, 1991) which can be facilitated by focusing on one’s body or on counting while falling asleep (Tholey & Utecht, 1987). Likewise, Tibetan sleep yoga focuses on falling asleep consciously as well. Practicing dream yoga, one directs his/her attention on five differently-colored lights on five different spots in the body: yellow (front), green (left), red (rear), blue (right) and whitish-blue (center) (Wangyal Rinpoche, 1998).

External stimuli induction techniques comprise every external stimulus which is applied to the sleeper during REM sleep (e.g., LaBerge, 1987; Reis, 1989). In the sleep laboratory setting, the experimenter can monitor the sleep EEG and apply the stimulus, for example, 5 minutes after REM onset and awakened the dreamer to obtain dream reports. The devices developed for using at home have the problem of detecting REM sleep reliably and often do not have a wake-up function; therefore the dreamer has to wake him/herself up directly out of the lucid dream. DreamLight is an example for a device that can be used at home; the sleep mask is worn during sleep and sends out light signals when the eye movements associated with REM sleep are detected (LaBerge & Levitan, 1995; Levitan & LaBerge, 1993). LaBerge, Owens, Nagel, and Dement (1981) investigated the ef-

fect of acoustic stimuli on lucid dream frequency: a sound (“This is a dream.”) was repeatedly played ten minutes after REM sleep onset. Electric stimuli were applied during REM sleep as well, for example on the wrist (Hearne, 1983). Tactile, water and vestibular stimuli have been applied in a similar manner (Hearne, 1978; Leslie & Ogilvie, 1996; Paul, Schädlich, & Erlacher, 2014; Reis, 1989). Using brain stimulation, Voss et al. (2014) elicited the effects of transcranial alternating current stimulation (tACS) on dreaming and lucid dream induction. Thereby, electrodes are placed on the prefrontal cortex and a low frequency current is applied during REM sleep. A similar study was done by Stumbrys, Erlacher, and Schredl (2013b): electrodes were placed on the dorso-lateral prefrontal cortex and transcranial direct current stimulation was used in an attempt to trigger lucidity.

Miscellaneous techniques cover those techniques which cannot be assigned to the other two categories, meaning for example intake of supplements or drugs such as vitamin B12, Donepezil or Galantamine (Aspy, Madden, & Delfabbro, 2018; Mizuno, Kameda, Inagaki, & Horiguchi, 2004; Sparrow, Carlson, & Hurd, 2016; Stumbrys & Erlacher, 2014).

All of these techniques aim at increasing lucid dream frequency, but how effective are they? The review of Stumbrys et al. (2012) sums up studies which investigated lucid dream induction techniques. The evidence of their effectiveness is encoded in a traffic light system: good, moderate and bad effectiveness. According to Stumbrys et al. (2012), five techniques seem to have a good effectiveness: MILD, reflection, intention, light stimuli, and WBTB. Tholey’s combined technique which comprises reflection, intention/ suggestion (Tholey, 1983) seemed to be fairly effective, too. Moderate effectiveness was seen in nine techniques: suggestion, hypnosis, WILD (counting and body image), acoustic, vibro-tac-

Table 1. Lucid dream induction techniques and their division into cognitive techniques, external stimuli and miscellaneous techniques

Category	Technique
Cognitive techniques	Mnemonic Induction of Lucid Dream (MILD)
	Reflection (Reality-Checks, Critical Questions)
	Intention/Suggestion
	Castaneda technique
	Hypnosis
	Meditation
	Wake up Back To Bed (WBTB)
	Wake-Initiated Lucid Dreaming (WILD)
	Tibetan Dream Yoga
External stimuli	Light
	Acoustic stimuli
	Electric shocks
	Vibration
	Vestibular stimuli
	Water
	Brain stimulation
Miscellaneous techniques	Supplements (Vitamin B12)
	Drugs (Donepezil, Galantamine)

tile, electric and vestibular stimuli and also Donepezil intake. Poor effectiveness was seen in alpha feedback and water stimuli. More recent studies showed effectiveness of galantamine, vitamin B12 (Aspy et al., 2018; LaBerge, LaMarca, & Baird, 2018; Sparrow et al., 2016), and brain stimulation (Stumbrys et al., 2013b) in terms of inducing lucidity.

With respect to the beneficial properties of lucid dreaming, a major issue is the lack of awareness of the wider population concerning lucid dreams and their induction techniques, respectively. So far, no attempt has been made to address the issue of the prevalence of lucid dream induction techniques. Only Lüth (2015) asked if and wherefrom the participants knew of lucid dreaming; however, lucid dream induction techniques were not asked about. It is to be noted in that study 20% (N=55) of the sample consisted of lucid dream forum members (total N=270). Another factor differing from the present study was the mean age which was lower (mean: 30.9 years). Lüth (2015) found that about two thirds of participants had heard about lucid dreaming previous to the study, differentiated into forum members (100%) and others (54%). For the total sample, the main sources were reports of friends (48%), scientific literature (28%), esoteric literature (12%) and other literature (25%), TV/Web (19%) and experience (5%). Other sources (13%) included school, college and art classes.

The aim of the present study was to elicit the degree of lucid dream induction technique awareness. Therefore, an exploratory analysis with the following factors was computed: gender, age, education and lucid dream frequency. Additionally, the level of knowledge of lucid dream induction techniques was asked and the same exploratory analysis was done for the influence factors.

2. Method

2.1. Participants

Overall, 1380 persons (777 women, 603 men) completed the online survey. The mean age of the sample was 51.63 ± 14.13 years (range: 17 to 93 years). The distribution concerning education was the following: not finished school (N = 3), 9 years of school ("Hauptschule"; N = 184), O-level ("Mittlere Reife"; N = 431), A-levels ("Fach-/Hochschulreife"; N = 316), university (N = 397) and doctorate (N = 49). The questions regarding lucid dream induction techniques were only presented to those participants who indicated to have had at least one lucid dream. Altogether, 716 participants (425 women, 291 men) with an average age of 50.10 ± 14.39 years (range: 20 to 88) answered these questions. The distribution concerning education among this subsample was the following: not finished school (N = 3), 9 years of school ("Hauptschule"; N = 73), O-level ("Mittlere Reife"; N = 215), A-levels ("Fach-/Hochschulreife"; N = 174), university (N = 220) and doctorate (N = 31).

2.2. Research Instruments

For eliciting lucid dream frequency, an eight-point rating scale was presented ("How often do you experience so-called lucid dreams (see definition below)?" 0 = never, 1 = less than once a year, 2 = about once a year, 3 = about two to four times a year, 4 = about once a month, 5 = two to three times a month, 6 = about once a week, 7 = several times a week. A short definition was given: "In a lucid dream, one is aware that one is dreaming during the dream.

Table 2. Lucid dream induction techniques elicited in the questionnaire

Technique name	Technique description
Wake up Back To Bed (WBTB)	Wake up two hours before your usual wake up time, stay awake for app. 30 minutes and fall asleep again
Castaneda technique	Look at your hands during the daytime
Mnemonic Induction of Lucid Dreaming (MILD)	After waking up, scan the dream to extract dream signals that can be used in induce lucidity.
Reality-checks	Perform a certain task to check whether you are awake or dreaming
Critical questions	Ask yourself the question whether you are awake or dreaming
Suggestion	For example: "This night I will know in my dream that I am dreaming."
Wake-Initiated Lucid Dreaming (WILD)	Consciously falling asleep with direct entry to a lucid dream
Hypnosis	Hypnotist, self-hypnosis or via audio with suggestions concerning lucid dreaming
External signals	During sleep, using a specific device which sends out light signals or other signals
Supplements	For example Vitamin B12

Thus it is possible to wake up deliberately, or to influence the action of the dream actively, or to observe the course of the dream passively." The retest reliability of the lucid dream frequency scale is $r = .717$ (Schredl, Berres, Klingauf, Schellhaas, & Göritz, 2014) or $r = .89$ (Stumbrys, Erlacher, & Schredl, 2013a) in a student sample.

To determine the participant's previous knowledge of lucid dreaming the following text was presented: "The following questions concern your previous experience with the topic of lucid dreaming." For this a three-point rating scale was used: 0 = No, 1 = one to two times 2 = several times. Three items were used: "I read something about lucid dreams in books, magazines or articles.", "I heard about lucid dreaming on the Internet, on TV or during lectures.", and "I heard about lucid dreaming through friends."

Based on literature research, 10 induction techniques were chosen which seemed to be most common (Stumbrys & Erlacher, 2014; Stumbrys et al., 2012). In order to elicit the knowledge and application of these techniques, respectively, table 2 was presented to the subjects (including a short description of the techniques). Additionally, a free text field was presented. This could be used to specify a known or an applied technique which had not been listed. Participants had to indicate whether they had heard or read about a specific technique (or not) and whether they had already applied it (or not).

2.3. Procedure

The participants completed the online survey between January 25, 2017 and January 31, 2017. The language of the survey was German. The link of the study which was posted on the online panel www.wisopanel.net and the registered persons were informed via email about the new study. Within this panel, 9864 persons with an interest in online stud-

ies and with heterogenic demographic backgrounds were registered at that time. The participation was voluntary and unpaid.

If the participants indicated that s/he never had a lucid dream, s/he was excluded from the subsequent questions concerning lucid dream induction techniques. The sum, mean value and standard deviation of all known and applied techniques, respectively, were calculated. This calculation included techniques named in the free text field.

2.4. Statistical analysis

The software package used to carry out the statistical procedures was SAS 9.4 for Windows. To explore the question as to whether induction techniques or previous knowledge, respectively, are related to lucid dream frequency, gender, age, and education analyses were performed through ordinal or logistic regressions since the scale levels were ordinal or binary. For the sum scores, parametric regressions were used due to the interval scale level.

3. Results

Regarding lucid dream frequency, about 45% of the participants had never experienced a lucid dream (see table 3). The number of infrequent lucid dreamers is high, too (about 32%). Frequent lucid dreamers (Snyder & Gackenbach, 1988) are rare; only about a fifth have lucid dreams about once a month or more often.

When the subjects were questioned as to whether they had already heard about lucid dreaming in literature, the Internet or through friends (see table 4), about three quarters indicated that they had no previous knowledge with respect to these three options. Approximately 10% of the participants had heard about lucid dreaming via one of the three channels about lucid dreaming. Just a small number of the participants had heard about lucid dreaming several times.

The participants were asked about several induction techniques for lucid dreaming and whether they knew or had already applied them, respectively. Table 5 shows the results. The most common techniques are critical questions, reality checks, hypnosis and supplements. Less common are suggestion, MILD, WILD and WBTB. The least known techniques are Castaneda and external signals. Applied techniques are mostly critical questions, reality checks, supplements, suggestion, and Wake-Initiated Lucid Dreaming (WILD). Other techniques were applied rather seldom. The other category was rarely checked and included top-

Table 3. Lucid dream frequency

Category	Frequency	Relative frequency
Several times per week	39	2.83%
About once a week	64	4.64%
Two or three times a month	101	7.32%
About once a month	103	7.46%
About two or four times a year	189	13.70%
About once a year	89	6.45%
Less than once a year	170	12.32%
Never	625	45.29%

Table 4. Previous experience regarding lucid dreams

Category	Literature	Internet	Friends
Several times	2.83%	2.25%	1.88%
One to two times	11.38%	11.01%	8.77%
None	85.80%	86.74%	89.35%

ics like mindfulness or resuming the dream that occurred before waking up.

The first three rows of table 6 show ordinal regressions for knowing about lucid dreaming via literature, Internet and friends. Age as well as lucid dream frequency shows a significant effect in all the dependent variables: older participants indicated hearing less about lucid dreaming and having a higher lucid dream frequency is related to knowing about it. Women and a higher education are related to higher knowledge levels of lucid dreaming through literature and via friends. Interestingly, the effects of gender and education for Internet as dependent variable were not significant, meaning that education does not have an influence in terms of information gathering via the Internet. Even people who had not benefited from many years of education tended to get an equal amount of information via the Internet.

The last two rows of table 6 present parametric regressions calculated with the same independent variables as above and the sum of known and applied induction techniques, respectively. Hereby, it is to be noted that only participants who stated that they had had at least one lucid dream were able to answer these questions. The mean value for the sum of knowing an induction technique is 2.45 ± 2.33 and for the sum of applying an induction technique 1.33 ± 1.63 . 25.45 % of participants knew no technique at all and 43.64% did not apply any technique. Concerning knowing a technique, an age effect can be seen whereas applying a technique is not correlated with age. The younger the participants are, the more techniques are known. Both variables (knowing as well as applying a technique) are significantly correlated with lucid dream frequency.

The same analysis was made for all 10 techniques (not shown). The independent variables stayed the same. The

Table 5. Known and applied techniques for inducing lucid dreams

Technique name	Known	Applied
Wake up Back To Bed (WBTB)	12.75% (714)	6.88% (712)
Castaneda technique	8.58% (711)	3.51% (713)
Mnemonic Induction of Lucid Dreaming (MILD)	13.24% (710)	6.63% (709)
Reality-checks	38.65% (709)	25.88% (707)
Critical questions	51.55% (708)	40.23% (707)
Suggestion	25.17% (711)	12.69% (709)
Wake-Initiated Lucid Dreaming (WILD)	18.13% (706)	12.02% (707)
Hypnosis	30.23% (708)	6.12% (709)
External signals	10.73% (708)	2.81% (711)
Supplements	29.84% (707)	12.02% (707)
Others	8.15% (699)	5.41% (702)

The numbers in parenthesis indicate the total number of participants who answered the item.

Table 6. Regression analysis eliciting the connection between three different media (literature, Internet and friends) and age, gender, education and lucid dream frequency

Genre	Age			Gender (1=f, 2=m)			Education			Lucid dream frequency		
	SE	χ^2	p	SE	χ^2	p	SE	χ^2	p	SE	χ^2	p
Read something about lucid dreaming (literature) (N= 1380) ¹	-.1373	9.3	.0023	-.1767	13.7	.0002	.2263	22.8	<.0001	.2994	53.4	<.0001
Read something about lucid dreaming (Internet) (N= 1380) ¹	-.2972	39.4	<.0001	-.0470	1.0	.3178	.0567	1.4	.2330	.2446	33.9	<.0001
Know something about lucid dreaming via friends (N= 1380) ¹	-.3207	36.7	<.0001	-.1381	6.6	.0104	.2045	14.0	.0002	.2338	25.3	<.0001
Sum of known induction techniques (N= 715) ²	-.1509	t= 4.0	<.0001	-.0702	t= -1.9	.0624	-.0252	t= -0.7	.4953	.1526	t= 4.2	<.0001
Sum of applied induction techniques (N= 715) ²	-.0289	t= -0.8	.4421	-.0572	t= -1.5	.1314	-.0396	t= -1.1	.2875	.1943	t= 5.3	<.0001

SE = Standardized estimate, ¹ordinal regression, ²parametric regression

main results are described in the following. Lucid dream frequency generally correlates significantly with the technique, especially when applied. However, the Castaneda technique seems to be an exception here. An education effect can be seen in WBTB and substance intake: these two techniques are mainly related to less educated subjects. A gender effect becomes significant only in critical questions; more men know and apply this technique. A negative age effect is significant with the Castaneda technique, reality checks, suggestion, hypnosis and external stimuli: the older the participants were, the fewer techniques they knew.

4. Discussion

The findings indicate that one quarter of the participants had heard of lucid dreaming one or several times previously via literature, Internet or friends. Concerning previous knowledge of lucid dreaming via literature, Internet or friends, age was negatively correlated with all variables, whereas female gender and higher education showed positive correlations with literature and friends meaning that younger people, women and a higher education are related to a higher amount of knowledge about lucid dreaming. For known and applied techniques, a sum score was calculated. The number of known techniques correlates negatively with age, but not with gender or education. The analysis did not reveal any significant differences for the applied techniques. For those participants who already had at least one lucid dream, the lucid dream induction techniques of reality checks, critical questions, hypnosis and supplements are most commonly known. These techniques are most often applied, too, except for hypnosis.

From a methodological viewpoint, it has to be mentioned that the sample did not consist primarily of persons with a high interest in lucid dreaming as the survey was advertised as a dream study and not specifically as a lucid dream study. Consistently, the lucid dream frequency was found to be comparable to a representative study (Schredl & Erlacher, 2011); the participants here, however, were likely to have a higher interest in dreams and a higher dream frequency in general (Schredl et al., 2014). Additionally, the sample had no representative distribution concerning education: general education was higher than expected (Statistisches Bundesamt, 2018). However, education was taken into account in the regression analyses which showing effects on several variables. The current sample was German speaking; it would be very interesting to carry out similar studies within other cultures (see: Erlacher et al., 2008). As

the original study was designed to measure lucid dreaming skills (Schredl, Rieger, & Göritz, 2018), the major parts of the questionnaires were designed for persons who had at least one lucid dream. First, there was a slight mismatch between the filter question of having had a lucid dream and lucid dream recall frequency and, secondly, the items of knowing or applying an induction technique could have been presented to all participants whether they had personal experiences with lucid dreams or not. Since about 50% of the sample did not answer these questions, the computed values probably need to be halved to get realistic results in relation to the total sample.

About a quarter of the participants had heard about lucid dreaming at least once via one of the media literature, Internet or friends which is in contrast to Lüth (2015) who found a much higher number: about half of the participants (not forum members) had heard of lucid dreaming. This discrepancy might be partly explained by the fact that that the Lüth study included members of lucid dream forums. In addition, the mean age of Lüth study was lower compared to age mean in the present study (30.9 years vs 51.63 years). Lastly, the level of education was higher in the study of Lüth (2015). Given the present findings of age and education effects of the present study, the lower percentages of the present sample (older, lower education) would be plausible. Interestingly, studies (Schredl et al., 2012; Voss et al., 2012) indicate that lucid dreams can occur at a very early age (6 yrs.) and it is likely that those children never heard about lucid dreaming, thus, it would be interesting to study the differences between persons having lucid dreams but never heard about the phenomenon (literature, internet, friends etc.) with persons who had external input on that topic. Participants were asked to specify their answers as to where they know lucid dreaming from in a free text field: participants indicated popular scientific magazines as well as books by e.g., Sigmund Freud, Howard Rheingold, Brigitte Holzinger, Carlos Castaneda and scientific articles by Michael Schredl, Jayne Gackenbach, Daniel Erlacher, and Ursula Voss. Concerning Internet, TV and movies, participants indicated web pages like Youtube and Wikipedia, German TV channels as well as the movies "Inception" or "Vanilla Sky". Interestingly, one participant indicated knowing about lucid dreaming because a homeopathic doctor asked about it.

The significant correlation of the lucid dream frequency with the three variables (literature, Internet, and friends) seems to be plausible. However, it is not clear whether participants were informed because they had had lucid dreams

or whether they had had lucid dreams because they were well informed. In addition, elderly people indicated having less knowledge in general which might be explained by less openness to new experiences (Schwaba, Luhmann, Denissen, Chung, & Bleidorn, 2018). Women seem to read more about lucid dreaming and also know more about it via friends. This is consistent with Schredl (2011) and Schredl and Schawinski (2010), who found that women read and talk more about dreams in general and thereby might read and talk more about lucid dreaming as well. Higher education correlates with literature and friends, but not with Internet which might point out that getting information from the Internet is not dependent on the level of education. Higher education is known to be correlated with more reading (Statistisches Bundesamt, 2018) which leads to a higher probability of reading about lucid dreaming and might explain the findings.

Of those participants who have already had one lucid dream, about three quarters indicated knowing at least one technique and more than half applied at least one technique. About half of all the participants answered the questions concerning lucid dream induction techniques, therefore the numbers need to be halved in order to have realistic results in relation to the total sample: consequently, about one third of the population knows about at least one lucid dream induction technique, meaning that more participants indicated knowing about lucid dream induction techniques than about lucid dreaming itself. This discrepancy might be explained by the fact that only literature, Internet and friends were asked and thereby e.g., own experience and other factors were not taken into account. Reality checks, critical questions, hypnosis and supplements were indicated most often in the subsample of those who had had at least one lucid dream which might be due to an easier memorization of these techniques. Critical questions were named in about half the cases; by taking into account that these were about half of the whole sample, about one quarter of the population can be expected to know about critical questions. Reality checks, critical questions, supplements, suggestion, and Wake-Initiated Lucid Dreaming (WILD) were applied most often, possibly because their application is rather simple. The list presented to the participants (Table 2) seems rather exhaustive as participants mentioned other techniques very infrequently. Surprisingly, WBTD and supplements are correlated with lower education; the reason, however, remains unclear.

To summarize, this study found that a relatively high number of participants knew about lucid dream induction techniques and also applied them to a high degree. In the future, a representative study is needed to compare the numbers collected in the present study. Additionally, it might be interesting to design a retrospective questionnaire asking about the motivation for applying a technique in the first place, how a certain technique is chosen and how effective the induction technique is in a home setting as the effectiveness of the induction techniques have so far only been studied within an experimental design.

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